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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/674,925	11/08/2000	Jyoti Kiron Bhardwaj	WLJ.067	7580

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EXAMINER

AHMED, SHAMIM

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 01/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/674,925

Applicant(s)

BHARDWAJ ET AL.

Examiner

Shamim Ahmed

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 November 2002.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 31 and 32 is/are allowed.
- 6) ☒ Claim(s) 1-30 and 33-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-10, 13-18 and 33-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Kawasaki et al (4,795,529).

Kawasaki et al disclose an apparatus and a process, wherein etching step and deposition step can be carried out alternately.

Kawasaki et al also teach that the two alternating steps have different processing parameters such as the voltage is different in the two alternating steps (col.1, lines 66-68, col.2, lines 1-2, and lines 12-17).

Kawasaki et al, further disclose that the plasma generation for the two steps are stabilized by a matching box, that consists of capacitor (col.3, lines 53-65 and col.16, lines 19-21).

As to claim 4, Kawasaki et al teach that the RF power is inductively coupled into the plasma (see figure 1).

As to claims 6-7, Kawasaki et al teach that the matching box is controlled by electrically such as a controller (col. 7, lines 6-20, col.15, lines 28-32).

As to claims 14-15, Kawasaki inherently teach that the capacitors are adjusted to different values for each of the steps because the matching box or matching unit is adapted to control the RF power source.

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As to claims 17 and 18, Kawasaki teaches that the positions of the capacitor do not vary between etch and deposition step (figure 16).

2. Claims 1-5, 19-25, 29-30 and 33-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Okudaira et al (4,985,114).

Okudaira et al disclose a process, wherein etching and deposition is performed alternately into a reaction chamber at predetermined time intervals.

Okudaira et al also disclose that at least etching gas and the deposition gas are supplied alternately and for a certain period of time etching gas and deposition gas can be supplied simultaneously and continuously (col.2, lines 41-49 and figures 1 and 3).

Okudaira et al, further disclose that the intensity of the power is controlled by an impedance matching circuit for compensating the high frequency power supply (col.5, lines 15-17).

As to claim 19, Okudaira et al teach that the plasma is stabilized by maintaining a reduced pressure of the alternating etching and depositing gas (col.5, lines 38-42).

As to claim 20, Okudaira et al teach that deposition gas is supplied before the etching gas is switched off or vice-versa (see figure 3).

As to claims 29 and 30, Okudaira et al teach that the pressure is monitored and adjusting the flow of the process gases into the chamber during the alternating etch and deposition steps (col.5, lines 38-42).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawasaki et al (4,795,529) as applied to claims 1-10,13-18 and 33-35 above, and further in view of Sadinsky (5,424,691).

Kawasaki discloses above in paragraph 1 but fails to disclose that a motor, which is driven by control signals, drives the matching unit.

However, Sadinsky discloses a method, wherein RF power is adapted through an impedance matching net work, that comprises capacitors and are driven by motor for proper adjustment and further more the motor is driven by a signal generator (col.3, lines 28-34 and lines 60-col.4, lines 5).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to employ Sadinsky's teaching into Kawasaki et al's method for proper adjustment of the capacitors in the matching unit as taught by Sadinsky.

5. Claims 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawasaki et al (4,795,529) as applied to claims 1-10,13-16 and 33-35 above, and further in view of Leiphart (5882,488).

Kawasaki discloses above in paragraph 1 but fails to disclose that a further gas can be introduced into the chamber to stabilize the plasma.

However, Leiphart teaches that the introduction of an inert gas such as argon or any noble gas can be used into the chamber to stabilize the plasma (col.10, lines 66-col.11, lines 4).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to employ Leiphart's teaching into kawasaki's method for stabilizing the plasma as taught by Leiphart.

#### ***Allowable Subject Matter***

6. Claims 31-32 are allowable over prior art.

7. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not teach providing a chamber in which a portion is separated from a main part of the chamber by a deflectable member and also does not teach that the volume of the separated portion is larger than the main part as the context of claims 31 and 32.

#### ***Response to Arguments***

8. Applicant's arguments filed 11/12/02 have been fully considered but they are not persuasive.

Applicants argue that Kawasaki et al do not teach the stabilizing of the plasma by matching the impedance of the plasma through a matching unit.

Applicants also argue that Kawasaki et al can not be seen how the adjustment of the bias voltage used to accelerate ions to the workpieces could have any stabilizing effect on the bulk plasma properties, wherein the plasma is formed by ECR source.

In response, examiner states that Kawasaki et al teach that a plasma treating method, wherein an RF power is coupled to the plasma and connected to a matching box, which is controlled by a controller in order to control the RF power for adjusting the voltage during the alternating etching and deposition process (see the rejection).

Furthermore, Applicants do not show any evidence that the plasma generated by the ECR source can not be adjusted or stabilized by adjusting the voltage of the RF power through a matching box.

As to Okudaira et al, Applicants argue that the adjustment of the matching unit between the RF power supply and the sample stand has no effect on the plasma, which is created by the microwave source.

In response, examiner states that Okudaira et al teach an alternating supplying of etching gas and deposition gas and a power supply control device for periodically turning on and off the power supply means for generating the plasma, wherein the intensity of the power is controlled by an impedance matching circuit (col.2, lines 45-col.3, line 3).

So, Okudaira et al's matching unit has effect on the plasma generation for providing an efficient dry etching method in order to make possible microminiature processing without any microloading effect.

Therefore, Okudaira et al teach an alternate etching and deposition process, wherein the plasma generation can be stabilized by controlling intensity of the power supply through a power supply control device as taught by Okudaira et al.

***Conclusion***

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (703) 305-1929. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703)-872-9310 for regular communications and (703) 872-9311 for After Final communications.

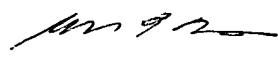


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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Shamim Ahmed  
Examiner  
Art Unit 1765

SA  
January 22, 2003

  
BENJAMIN L. UTECH  
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